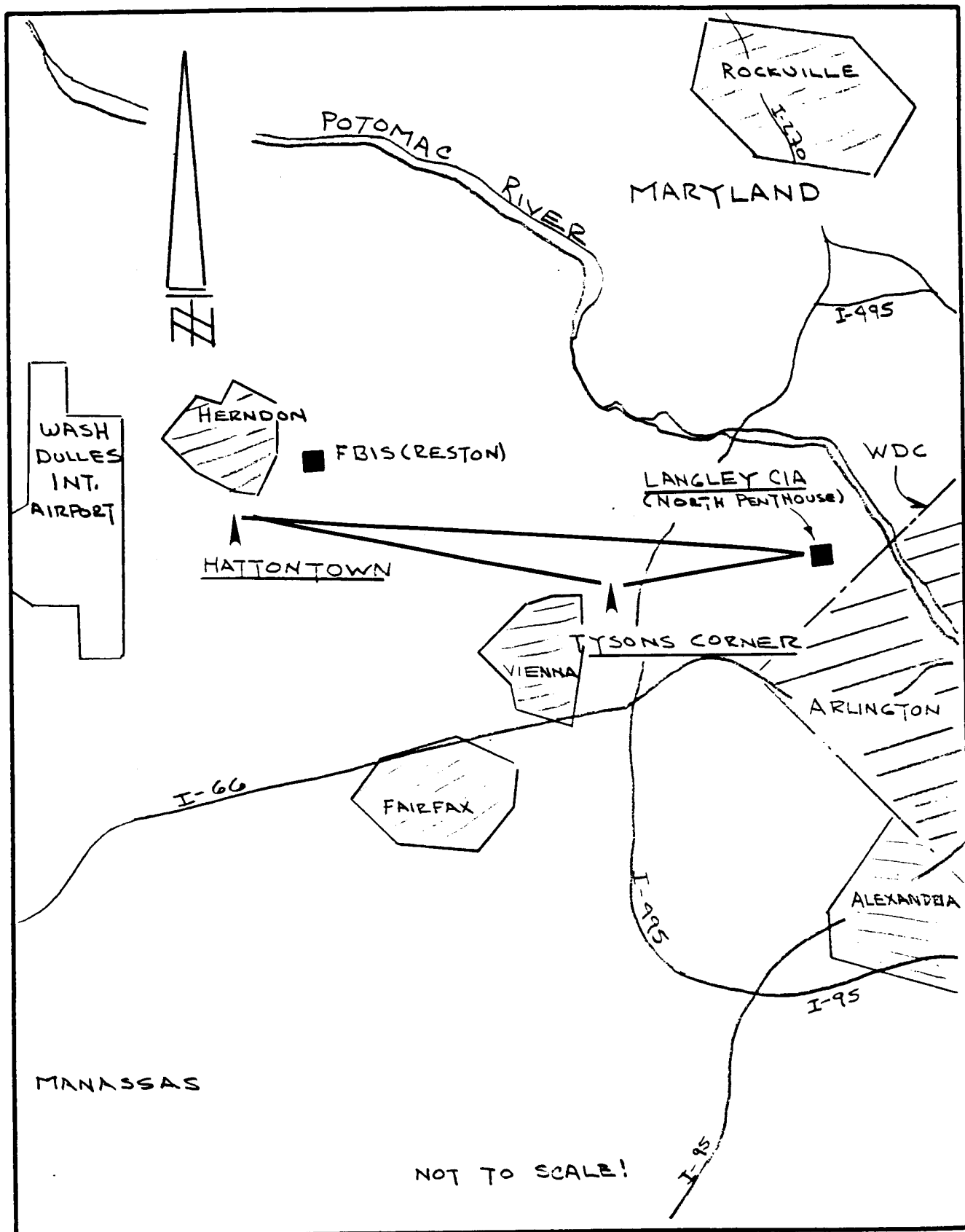
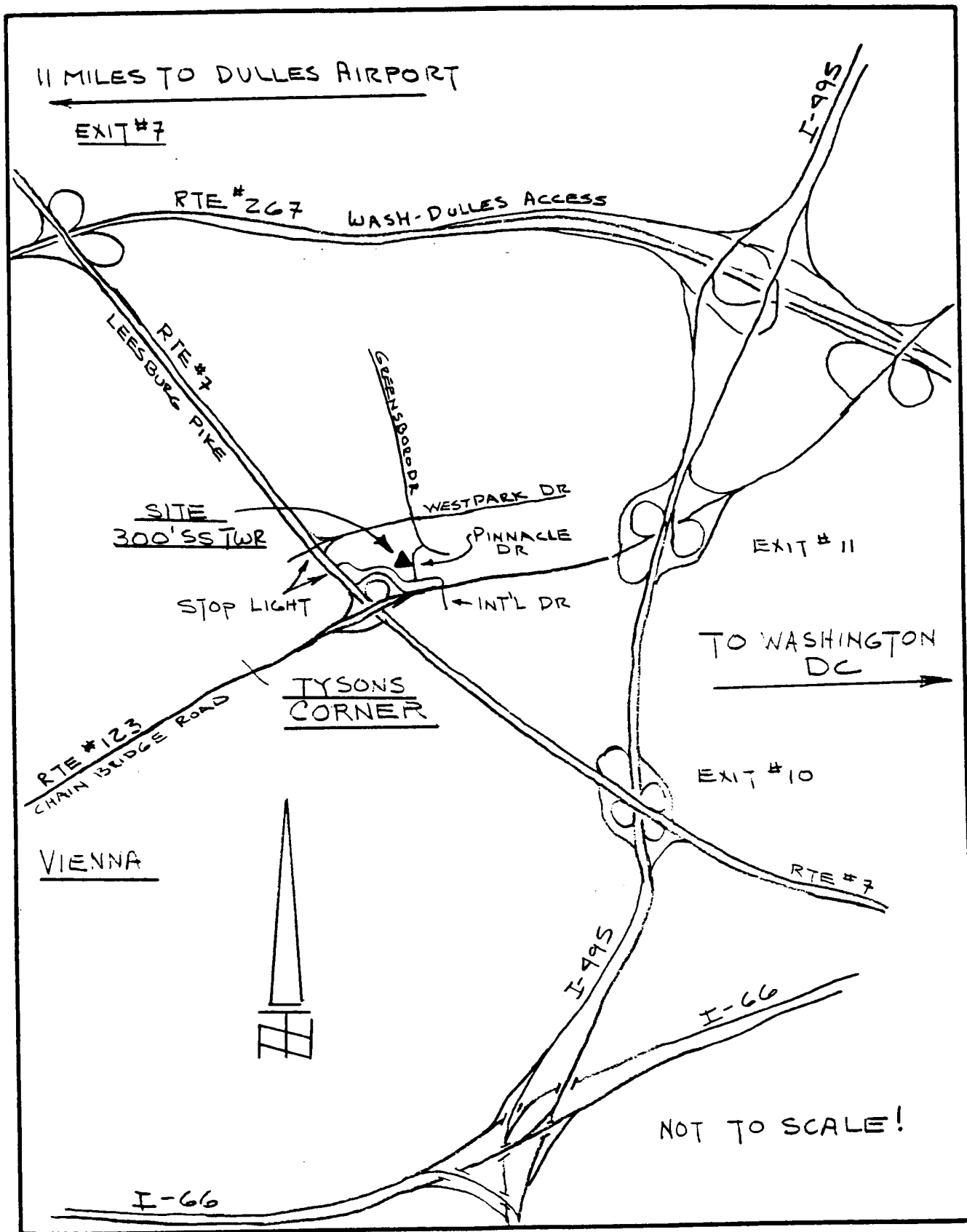


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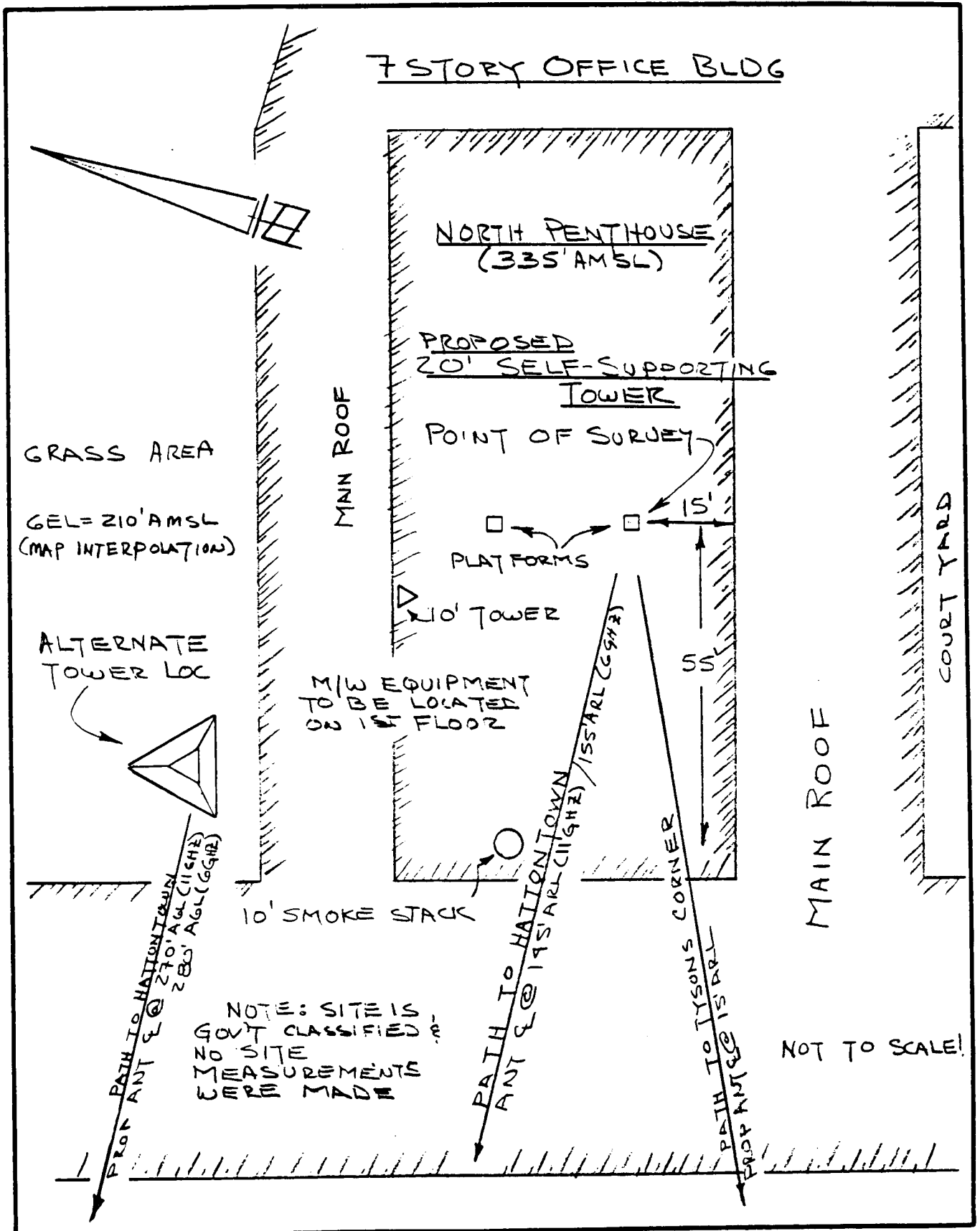
SYSTEM MAP

COMSEARCH



TYSONS CORNER
SITE LOCATION MAP

COMSEARCH



CIA LANGLEY (NORTH PENTHOUSE)
SITE SKETCH

COMSEARCH

①

INTERACTIVE PATH PROFILE DATUMSITE: HATTONTOWNLAT: 33° 56' 31"LONG: 77° 23' 04"ELEVATION: 383 'ASHLAZIMUTH FORWARD: 86° 31' 41"PATH DISTANCE: 12.9SITE: LAUGHEY CIA (NORTH PENTHOUSE)LAT: 22° 57' 11"LONG: 77° 08' 41"ELEVATION: 210 'ASML(MAP INTERDITATION ONLY)
AZIMUTH REVERSE: 266° 40' 43"

FREQUENCY: _____

DIST	ELEV	OBST	11.2 GFE K(1) +2.6F	6.175 GFE K(1) +2.6F	NOTE
0	388				
0.2	371				
0.35	379				
0.45	375				
0.9	430				
1.15	472	T=76 F=10	22.2 GFE 9.0 + 13.2	20.3 GFE 9.0 + 12.9	GROUP DECIDUOUS TREE IN APT COMPLEX
1.35	442				
1.5	466				
1.55	439				
1.65	457	T=63 F=10	12.4 + 15.5	33.2 GFE 12.4 + 20.9	GROUP DECIDUOUS TREE IN APT COMPLEX
1.7	428				
1.75	432				
1.8	424				
1.95	443				
2.35	356				
2.45	412				
2.65	366				
2.7	384				
2.85	378				
2.9	400				
3.2	392				
3.4	350				
3.65	393				
4.1	270				
4.3	295				
4.35	258				
4.45	300				

(2)

MICROWAVE PATH PROFILE DATASITE: HATTON TOWNSITE: LANSLEY CIA / NORTH PORTHEADLAT: LAT: LONG: LONG: ELEVATION: 'ASHLELEVATION: 'ASMLAZIMUTH FORWARD: AZIMUTH REVERSE: PATH DISTANCE: FREQUENCY:

DIST	ELEV	OBST	K() + F	K() + F	NOTE
4.6	245				
4.7	295				
4.9	195				
5.35	312				
5.4	285				
5.45	325				
5.65	225				
5.9	295				
6.15	326				
6.3	300				
6.5	276				
6.6	345				
6.85	386	T=69 F6=10	53.3 (512.3) 22.6 + 23.1	53.3 (512.3) 22.6 + 31.2	GROUP DELICIOUS TREE VIA RESIDENCE
7.13	302				
7.5	367				
7.6	275				
7.75	362				
8.1	308				
8.3	352	T=78 F6=10			
8.45	394				
8.75	266				
9.05	372	T=97 F6=0	40.4 (512.3) 23.2 + 21.2	51.8 (512.3) 23.2 + 23.6	GROUP LARGE DECIDUOUS TREES
9.1	348				
9.15	354				
9.5	258				
9.55	286				
9.7	215				

WICACUAVE PATH PROFILE DATUM

FREQUENCY:

[illegible]

MICROWAVE PATH PROFILE DATUM

(1)

SITE: HATTOWTOWIDSITE: TYSONS CORNERLAT: 38° 56' 31"LAT: 38° 55' 13"LONG: 77° 23' 04"LONG: 77° 13' 48"ELEVATION: 398 'ASMLELEVATION: 519 'ASMLAZIMUTH FORWARD: 100° 08' 00"AZIMUTH REVERSE: 280° 13' 49"PATH DISTANCE: 8.5FREQUENCY: 11.2 GHz ± 1.78

Freq 11.2 / 6.55

FD = 1.78

DIST	ELEV	OBST	K(1) +1/2 F	K(1) +1/2 F	NOTE
0	398				
0.2	398				
0.3	376				
0.4	395				
0.6	386				
0.9	450				
1.05	462	44' * F6=10	5.2	12.4 13.5	GROUP OF DECIDUOUS TREES ALABAMA COMPLEX AREA
1.1	442			13.5	* SINGLE LARGE
1.2	420				81 DECIDUOUS TREES 31' NORTH - DATA FROM EXISTING TOWER
1.4	400				
1.5	390				
1.55	405				
1.6	400				
1.65	423				
1.7	400				
1.75	422				
1.8	418				
2.0	360				
2.1	325				
2.2	355				
2.25	392				
2.8	350				
2.9	374				
3.0	290	W			
3.1	365				
3.3	255				
3.4	270				
3.5	255				

②

MICROWAVE PATH PROFILE DATUMSITE: HATTONTOWNSITE: TYSONS CORNERLAT: LAT: LONG: LONG: ELEVATION: 'ASMLELEVATION: 'ASMLAZIMUTH FORWARD: AZIMUTH REVERSE: PATH DISTANCE: FREQUENCY:

11.2/16.125

1.78

DIST	ELEV	OBST	K(1) +.6F	K(1) +.6F	NOTE
3.75	342				
4.0	240				
4.15	270				
4.2	225				
4.3	270				
4.4	215				
4.5	225				
5.0	227				
5.15	210				
5.2	225				
5.3	215				
5.4	225				
5.5	240				
6.0	403	T=96 F=5.0	10.2 - 23.0	2.2 - 23.0	SEVERAL WIDE JAK Arrive here
6.1	388				
6.2	390				
6.5	378				
6.8	403	T=79 F=5.0			GROUP DECIDUOUS
6.9	412				
7.1	385				
7.2	406				
7.3	412				
7.4	325				
7.5	406				
7.6	400				
7.8	463	T=88 F=5.1	3.6 - 10.2	3.6 - 26.0	GROUP DECIDUOUS
8.1	416				
8.2	430				
8.5	519				

(1)

MICROWAVE PATH PROFILE DATUMSITE: TYSONS CORNERLAT: 38 ° 55 ' 13 "LONG: 77 ° 13 ' 48 "ELEVATION: 519 'ASMLAZIMUTH FORWARD: 63 ° 46 ' 15 "PATH DISTANCE: 5.1SITE: LANGLEY CIA (NORTH REATHAM)LAT: 38 ° 57 ' 11 "LONG: 77 ° 08 ' 41 "ELEVATION: 210 'ASML

(MAP INTERPOLATION)

AZIMUTH REVERSE: 243 ° 49 ' 28 "FREQUENCY: 11.2 GHz

11.2 GHz

DIST	ELEV	OBST	K(1) + 10F	K() + F	NOTE
0	519	TWP=300			
0.05	506	B=175	0.2 (634.1) 2.9		
0.35	440				
0.4	455				
0.45	428				
0.5	476				
0.6	385				
0.7	394				
0.8	335				
1.1	342				
1.3	335				
1.4	305				
1.75	376				
1.8	345				
1.95	354				
2.15	305				
2.2	322				
2.65	255				
2.9	305				
3.0	273				
3.15	304				
3.2	297				
3.3	314				
3.4	302				
3.45	317				
3.6	300				
3.65	314	F=71 F6=10	16.6 (411.5) 3.5 413.1		

FREQUENCY:

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MICROWAVE PATH PROFILE DATUMSITE: Denton Tnf / CenterSITE: Langley VTTLAT: LAT: LONG: LONG: ELEVATION: 'ASMLELEVATION: 'ASMLAZIMUTH FORWARD: AZIMUTH REVERSE: PATH DISTANCE: FREQUENCY:

DIST	ELEV	OBST	K() + F	K() + F	NOTE
0.0	478				
0.25	357				
0.95	405				
1.15	369				
1.3	403				
1.45	345				
1.5	360				
1.65	320				
1.95	379				
2.2	345				
2.25	352				
2.35	332				
2.45	341				
2.5	380				
2.55	332				
2.7	314				
2.7	323				
3.0	289				
3.15	304				
3.3	198				
3.4	210				
3.6	283				
3.75	209				
3.9	218				
4.0	209				
4.2	211				
4.25	255				
4.3	219				

(2)

MICROWAVE PATH PROFILE DATUMSITE: Reston Int'l CenterSITE: Langley WTLAT: • ' "LAT: • ' "LONG: • ' "LONG: • ' "ELEVATION: 'ASMLELEVATION: 'ASMLAZIMUTH FORWARD: • ' "AZIMUTH REVERSE: • ' "PATH DISTANCE: FREQUENCY:

DIST	ELEV	OBST	K() + F	K() + F	NOTE
4.4	2107				
4.75	345				
4.9	328				
5.0	392				
5.15	354				
5.35	371				
5.4	352				
5.5	418				
5.7	325				
5.75	256				
5.9	273				
6.0	320				
6.05	2107				
6.3	3100				
6.6	299				
6.75	352				
6.8	212				
6.9	340				
6.95	327				
7.1	342				
7.2	259				
7.45	3107				
7.55	379				
7.6	340				
7.95	256				
8.0	281				
8.15	217				
8.75	2107				

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MICROWAVE PATH PROFILE DATUMSITE: Hatten IronLAT: 39 ° 56 ' 31 "LONG: 77 ° 23 ' 04 "

ELEVATION: _____ 'ASML

AZIMUTH FORWARD: 87 ° 20 ' 15 "PATH DISTANCE: 13.17SITE: Lanaleu WTLAT: 38 ° 57 ' 02 "LONG: 77 ° 03 ' 25 "

ELEVATION: _____ 'ASML

AZIMUTH REVERSE: 267 ° 29 ' 28 "

FREQUENCY: _____

DIST	ELEV	OBST	K() + F	K() + F	NOTE
0.0	388				
0.3	371				
0.35	379				
0.45	375				
0.9	430				
1.15	474	T=76' FL=10			GROUP DECIDUOUS ADJACENT APARTMENT BLDGS
1.35	452				
1.5	466				
1.55	429				
1.65	456	T=68' FL=10			GROUP DECIDUOUS
1.7	422				
1.75	422				
1.8	422				
1.85	413				
2.0	376				
2.15	399				
2.45	3102				
2.7	374				
2.75	3105				
2.8	382				
2.55	374				
2.95	403				
3.2	357				
3.25	372				
3.4	338				
3.5	3660				
3.55	353				
3.7	487				

(2)

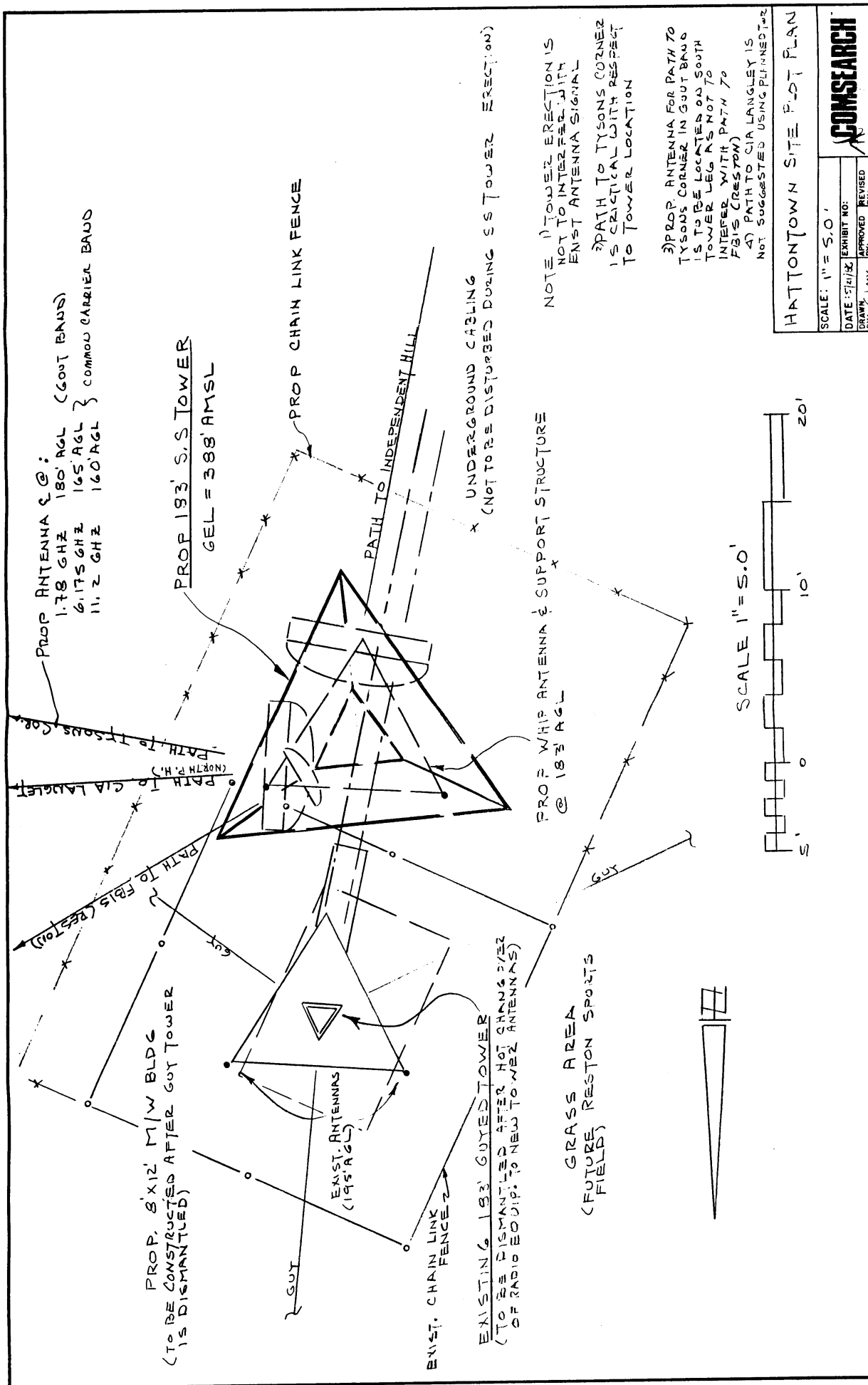
MICROWAVE PATH PROFILE DATUMSITE: Han HanSITE: Long AnLAT: • • •LAT: • • •LONG: • • •LONG: • • •ELEVATION: ASMLELEVATION: ASMLAZIMUTH FORWARD: • • •AZIMUTH REVERSE: • • •PATH DISTANCE: • • •FREQUENCY: • • •

DIST	ELEV	OBST	K() + F	K() + F	NOTE
3.95	298				
4.05	372				
4.1	257				
4.2	280				
4.25	310				
4.3	2810				
4.4	253				
4.5	292				
4.6	258				
4.7	3210				
4.65	239				
4.75	281				
4.85	199				
5.0	318				
5.45	305				
6.5	323				
5.65	229				
6.8	248				
6.85	235				
6.15	320				
6.35	294				
6.5	302				
6.65	327				
6.9	393				
7.3	300				
7.4	351				
7.65	284				
7.7	3210				

NICROWAVE PATH PROFILE DATUMSITE: Hatten IronSITE: Lanahan WTLAT: LAT: LONG: LONG: ELEVATION: 'ASMLELEVATION: 'ASMLAZIMUTH FORWARD: AZIMUTH REVERSE: PATH DISTANCE: FREQUENCY:

DIST	ELEV	OBST	K() + F	K() + F	NOTE
7.0	314				
7.95	342				
8.25	329	W			
7.35	323				
7.5	343				
8.15	252				
8.15	278				
8.9	352				
9.0	329				
9.1	350				
9.2	279				
9.3	2110				
9.4	289				
9.15	321				
9.8	222				
10.2	384				
10.55	241				
10.65	2107				
10.7	259				
10.75	265				
10.95	217				
11.2	301				
11.45	2410				
11.5	271				
11.55	249				
11.15	213				
11.9	214				
12.0	241				

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HATTONTOWN SITE POST PLAN			
SCALE: 1" = 50'	EXHIBIT NO:	APPROVED	REVISED
DATE: 5/21/72	DRAWN: [signature]	BY: [signature]	BY: [signature]

COMSEARCH

USE OF FLAT EARTH PROFILE FOR WITHIN-THE-HORIZON
AND BEYOND-THE-HORIZON RADIO PATHS

1. USE THE SYMBOLS SHOWN BELOW
2. USE A CONVENIENT SCALE FOR DISTANCE AND ELEVATIONS
3. REPRESENT THE PATH AS A STRAIGHT LINE
4. CALCULATE THE EFFECTIVE EARTH CURVATURE TO CORRECT FOR EARTH BULGE AT THE CRITICAL POINTS AND ADD TO THE FLAT EARTH ELEVATION

$$h = \left(\frac{R}{2} \right) \lambda_1 \lambda_2$$

WHERE
 h = HEIGHT OF CORRECTION IN FEET
 R = RATIO OF EFFECTIVE EARTH RADII
 λ_1 = TRUE EARTH RADII
 λ_2 = TRUE EARTH RADII
 d_1 = DISTANCE FROM STATION "A" TO POINT UNDER CONSIDERATION IN STATUTE MILES
 d_2 = DISTANCE FROM STATION "B" TO POINT UNDER CONSIDERATION IN STATUTE MILES

5. ADD ANY MAN MADE STRUCTURES AND PERSONAL GROWTH
6. CALCULATE THE DESIRED FREQUENCY ZONE NOT FOR THE POINTS AND FREQUENCIES UNDER CONSIDERATION USING THE FOLLOWING FORMULAS AND ADD TO THE EXTENDED PROFILE

$$f_1 = \sqrt{\frac{30}{d_1}} \quad f_2 = \sqrt{\frac{30}{d_2}}$$

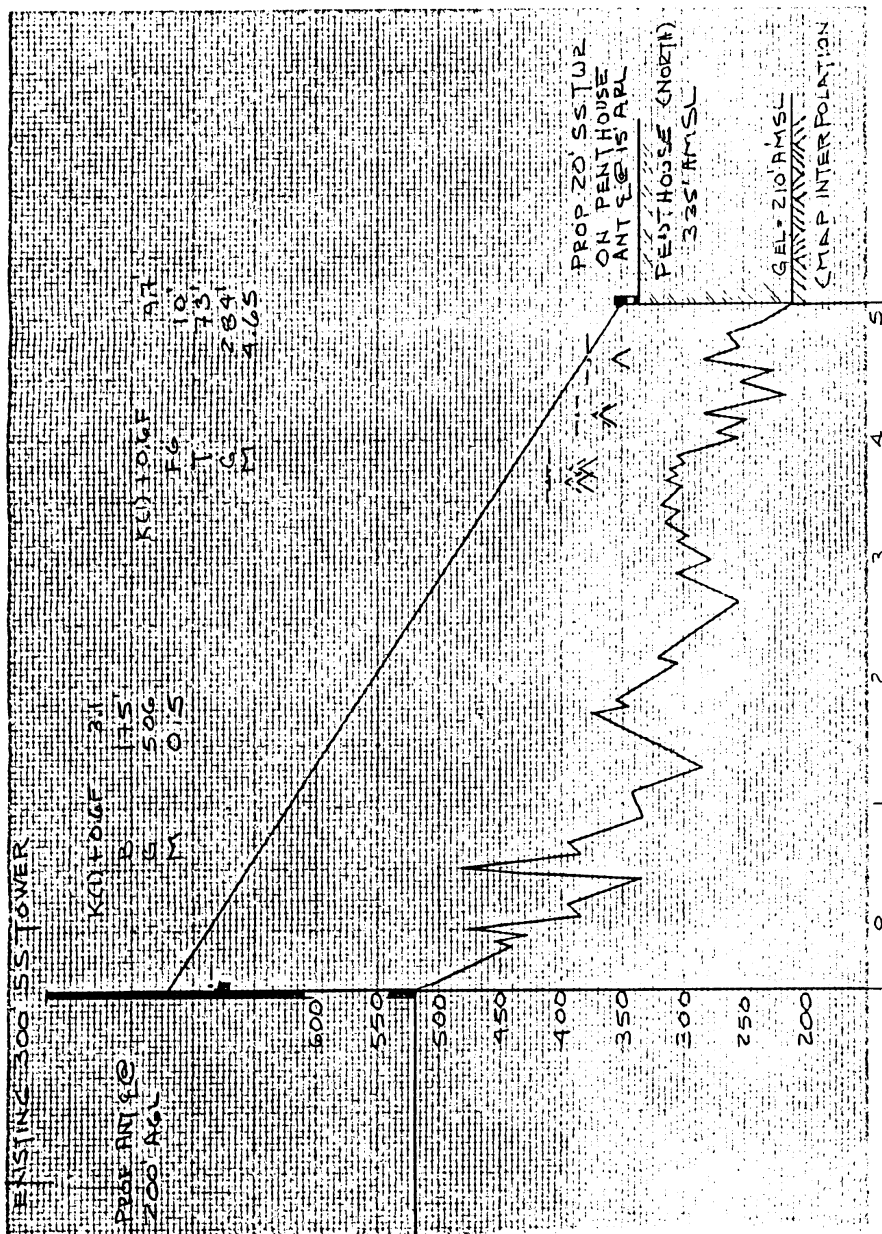
WHERE
 f_1 IS THE FREQUENCY OF THE FIRST FREQUENCY ZONE IN FEET
 f_2 IS THE FREQUENCY UNDER CONSIDERATION IN GIGAHERTZ (GP/10)
 d IS THE DISTANCE IN MILES FROM ONE END OF THE PATH TO THE POINT UNDER CONSIDERATION
 D IS THE TOTAL PATH LENGTH IN MILES
 F_n IS THE FREQUENCY OF THE n TH FREQUENCY ZONE IN FEET
 n IS THE ORDER OF THE FREQUENCY ZONE AND CAN BE ANY WHOLE POSITIVE NUMBER

SYMBOLS

FRESH ZONE CLEARANCE
 EARTH CURVATURE FROM K (m)
 MAN MADE STRUCTURE
 CONSTRUCTION OFF PATH WITHIN 100 FEET
 PREDICTED VEGETATION GROWTH
 EXISTING HEIGHT OF VEGETATION
 GROUND ELEVATION ANSL K (m)
 POSSIBLE REFLECTION POINT
 HEIGHT OF FINAL RADIATOR CENTERLINE ABOVE GROUND

STATION (A) TYSONS CORNER
 LAT 38° 55' 13" N
 LONG 77° 13' 43" W
 GROUND ELEV 210 FEET ABOVE MEAN SEA LEVEL
 REQUIRED HEIGHT OF FINAL RADIATOR CENTER LINE 200 FEET ABOVE GROUND
 AZIMUTH (A TO B) 63° 15' 15" CW FROM TRUE NORTH
 STATION (B) CIA LANGLEY (North P.H.)
 LAT 38° 53' 11" N
 LONG 77° 08' 41" W
 GROUND ELEV 210 FEET ABOVE MEAN SEA LEVEL
 REQUIRED HEIGHT OF FINAL RADIATOR CENTER LINE 15 FEET ABOVE GROUND
 AZIMUTH (B TO A) 283° 49' 28" CW FROM TRUE NORTH
 MAGNETIC DECLINATION FOR 11.2 GIGAHERTZ
 PATH LENGTHS AND DISTANCES ARE OF TRUE NORTH
 SCALED X INVERSE POSITION OTHER

EARTH PROFILE
 CUSTOMER OTI
 SYSTEM HATTOWNS-2010
 DESIGN DEPARTMENT DESIGN
 OTHER DESIGN



SYSTEM HATTOWNS-2010 - CIA LANGLEY
 VERTICAL SCALE 50 FEET—ELEVATION PER MAJOR DIVISION
 HORIZONTAL SCALE 1/2 MILES—PATH PER MAJOR DIVISION

STATION (A) TYSONS CORNER STATION (B) LANGLEY CIA (NORTH PENTHOUSE)

COMBISLAND
 INCORPORATED

USE OF FLAT EARTH PROFILE FOR WITHIN-THE-HORIZON AND BEYOND-THE-HORIZON RADIO PATHS

- USE THE SYMBOLS SHOWN BELOW
- USE A CONVENIENT SCALE FOR DISTANCE AND ELEVATIONS
- REPRESENT THE PATH AS A STRAIGHT LINE
- CALCULATE THE EFFECTIVE EARTH CURVATURE TO CORRECT FOR EARTH INCLINE AT THE CRITICAL POINTS AND ADD TO THE FLAT EARTH ELEVATION

$$h = \left(\frac{4082}{f} \right) f_1 f_2$$

WHERE

h = HEIGHT OF CORRECTION IN FEET

f = FREQUENCY IN MHz

f_1 = DISTANCE FROM STATION "A" TO POINT UNDER CONSIDERATION IN STATUTE MILES

f_2 = DISTANCE FROM STATION "B" TO POINT UNDER CONSIDERATION IN STATUTE MILES

ADD ANY MAN MADE STRUCTURES AND FORECASTED GROWTH

CALCULATE THE DESIRED PRESNEL ZONE RADIUS FOR THE POINTS AND FREQUENCIES UNDER CONSIDERATION USING THE FOLLOWING FORMULAS AND ADD TO THE EXTENDED PROFILE

$$r = \sqrt{\frac{2 \cdot 10^6}{f}} \cdot \sqrt{f_1} \cdot \sqrt{f_2}$$

WHERE

r IS THE RADIUS OF THE FIRST PRESNEL ZONE IN FEET

f IS THE FREQUENCY UNDER CONSIDERATION IN GHZ (1000 MHz)

f_1 IS THE DISTANCE IN MILES FROM ONE END OF THE PATH TO THE POINT UNDER CONSIDERATION

f_2 IS THE TOTAL PATH LENGTH IN MILES

r_1 IS THE RADIUS OF THE 1ST PRESNEL ZONE IN FEET

n IS THE ORDER OF THE PRESNEL ZONE AND CAN BE ANY WHOLE POSITIVE NUMBER

SYMBOLS

FRESHET ZONE CLEARANCE

EARTH CURVATURE FROM R (m)

MAN MADE STRUCTURE

OBSTRUCTION OFF PATH WITHIN 1000 FEET

PREDICTED VEGETATION GROWTH

EXISTING HEIGHT OF VEGETATION

GROUND ELEVATION AMSL K (m)

POSSIBLE REFLECTION POINT

HEIGHT OF FINAL NAVIGATION CENTERLINE ABOVE GROUND

STATION (A) HATTON TOWN

LAT $39^{\circ} 26' 21''$ N

LONG $72^{\circ} 56' 04''$ W

GROUND ELEV 338 FEET ABOVE MEAN SEA LEVEL

REQUIRED HEIGHT OF FINAL NAVIGATION CENTERLINE 100 FEET ABOVE GROUND

AZIMUTH (A) TO (B) 100 CW FROM TRUE NORTH

STATION (B) TYSON'S CORNER

LAT $39^{\circ} 55' 13''$ N

LONG $72^{\circ} 13' 43''$ W

GROUND ELEV 519 FEET ABOVE MEAN SEA LEVEL

REQUIRED HEIGHT OF FINAL NAVIGATION CENTERLINE 49 FEET ABOVE GROUND

AZIMUTH (B) TO (A) 280 CW FROM TRUE NORTH

PRESNEL CALCULATIONS MADE FOR 2.116 GHZ

MAGNETIC DECLINATION 11.2 OF TRUE NORTH

PATH AZIMUTHS AND DISTANCES ARE SCALED

OTHER POSITION

EARTH PROFILE

CERTIFICATION

SURVEY BY $S. L. W.$

DATE $5/24$

DRAWN BY $S. L. W.$

CHECKED BY $S. L. W.$

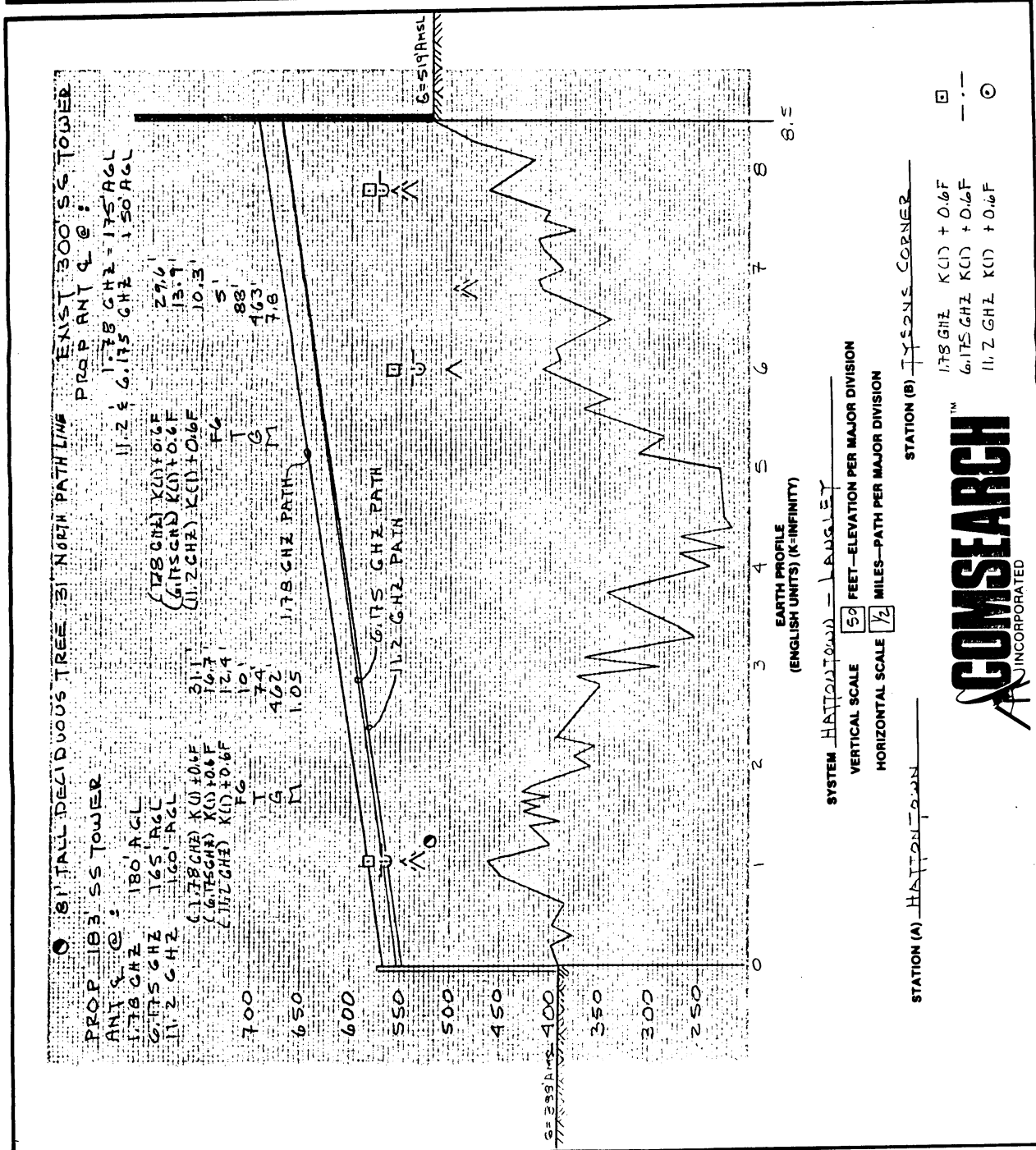
DATE

CUSTOMER $O. I.$

SYSTEM $HATTON TOWN$

DESIGN DEPARTMENT $ENGINEERING$

OTHER



USE OF FLAT EARTH PROFILE FOR WITHIN-THE-HORIZON
AND BEYOND-THE-HORIZON RADIO PATHS

1. USE THE SYMBOLS SHOWN BELOW
2. USE A CONVENIENT SCALE FOR DISTANCE AND ELEVATIONS
3. REPRESENT THE PATH AS A STRAIGHT LINE
4. CALCULATE THE EFFECTIVE EARTH CURVATURE TO CORRECT FOR EARTH BULGE AT THE CRITICAL POINTS AND ADD TO THE FLAT EARTH ELEVATION

$$h = \left(\frac{0.60}{K} \right) A_1 A_2$$

WHERE
h = HEIGHT OF CORRECTION IN FEET
K = RATIO OF EFFECTIVE EARTH RADIUS
TO TRUE EARTH RADIUS

1. DISTANCE FROM STATION "A" TO POINT UNDER CONSIDERATION IN STATUTE MILES
2. DISTANCE FROM STATION "B" TO POINT UNDER CONSIDERATION IN STATUTE MILES

3. ADD ANY MAN MADE STRUCTURES AND PERMANENT GROWTH
4. CALCULATE THE DESIRED FREQUENCY ZONE RADI FOR THE POINTS AND FREQUENCIES UNDER CONSIDERATION USING THE FOLLOWING FORMULAS AND ADD TO THE EXTENDED PROFILE

$$f_1 = \sqrt{\frac{30}{d}} \quad f_2 = \sqrt{\frac{30}{d}}$$

WHERE

1. IS THE RADIUS OF THE FIRST FRESNEL ZONE IN FEET
2. IS THE FREQUENCY UNDER CONSIDERATION IN GHERTZ (10⁹ HZ)
3. IS THE DISTANCE IN MILES FROM ONE END OF THE PATH TO THE POINT UNDER CONSIDERATION
4. IS THE TOTAL PATH LENGTH IN MILES
5. IS THE RADIUS OF THE NTH FRESNEL ZONE IN FEET
6. IS THE ORDER OF THE FRESNEL ZONE AND CAN BE ANY WHOLE POSITIVE NUMBER

SYMBOLS

- FRESNEL ZONE CLEARANCE
- EARTH CURVATURE FROM K (=)
- MAN MADE STRUCTURE
- OBSTRUCTION OFF PATH WITHIN 1000 FEET
- PREDICTED VEGETATION GROWTH
- EXISTING HEIGHT OF VEGETATION
- GROUND ELEVATION AMSL X (=)
- POSSIBLE REFLECTION POINT
- HEIGHT OF FINAL RADIATION CENTER LINE
- ABOVE GROUND

STATION (A) HATTONTOWN

LAT 38° 56' 31" N
LONG 77° 23' 04" W
GROUND ELEV 338 FEET ABOVE MEAN SEA LEVEL
REQUIRED HEIGHT OF FINAL RADIATION CENTER LINE 338 FEET ABOVE GROUND
AZIMUTH (A) TO (B) 86° 31' 41" CW FROM TRUE NORTH

STATION (B) CIA LANGLEY (NORTH PENTHOUSE)

LAT 38° 57' 11" N
LONG 77° 08' 41" W
GROUND ELEV 210 FEET ABOVE MEAN SEA LEVEL
REQUIRED HEIGHT OF FINAL RADIATION CENTER LINE 210 FEET ABOVE GROUND
AZIMUTH (B) TO (A) 266° 40' 43" CW FROM TRUE NORTH

FRESNEL CALCULATIONS MADE FOR 11.2 GHZ FREQUENCY
MAGNETIC DECLINATION 11° 2' 0" OF TRUE NORTH
PATH AZIMUTHS AND DISTANCES ARE SCALED INVERSE POSITION OTHER

CERTIFICATION

SURVEY BY: CA
DATE: 5/86
DRAWN BY: C
DATE: 5/86
REVISED BY:
DATE:

EARTH PROFILE

CLEARANCE CRITERIA BY

CLIENT SURVEYOR

DESIGN DEPARTMENT

OTHER

STATION (A) HATTONTOWN

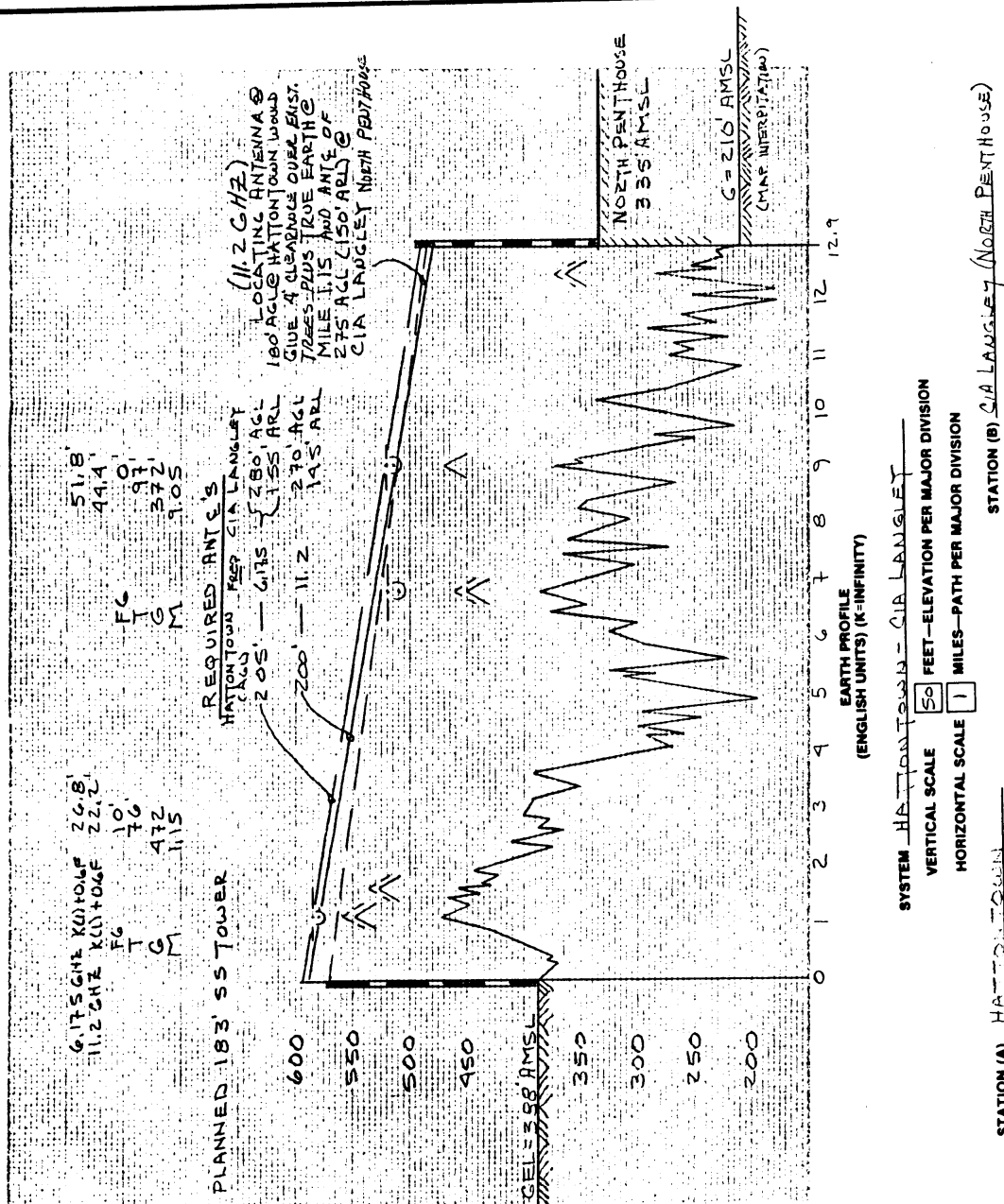
STATION (B) CIA LANGLEY (NORTH PENTHOUSE)

STATION (A) HATTONTOWN

STATION (B) CIA LANGLEY (NORTH PENTHOUSE)

STATION (A) HATTONTOWN

STATION (B) CIA LANGLEY (NORTH PENTHOUSE)



COMSEARCH
INCORPORATED

USE OF FLAT EARTH PROFILE FOR WITHIN-THE-HORIZON
AND BEYOND-THE-HORIZON RADIO PATHS

1. USE THE SYMBOLS SHOWN BELOW
2. USE A CONVENIENT SCALE FOR DISTANCE AND ELEVATIONS
3. REPRESENT THE PATH AS A STRAIGHT LINE
4. CALCULATE THE EFFECTIVE EARTH CURVATURE TO CORRECT FOR EARTH BULGE AT THE CRITICAL POINTS AND ADD TO THE FLAT EARTH ELEVATION

$$h = \left(\frac{805}{K} \right) \cdot F_1 \cdot F_2$$

WHERE

- h = HEIGHT OF CORRECTION IN FEET
K = RATIO OF EFFECTIVE EARTH RADIUS
TO TRUE EARTH RADIUS
F₁ = DISTANCE FROM STATION "A" TO POINT UNDER CONSIDERATION IN
STATUTE MILES
F₂ = DISTANCE FROM STATION "B" TO POINT UNDER CONSIDERATION IN
STATUTE MILES

5. ADD ANY MAN MADE STRUCTURES AND PERSONAL GROWTH
6. CALCULATE THE DESIRED FREQUENCY ZONE FOOT FOR THE POINTS AND FREQUENCIES
UNDER CONSIDERATION USING THE FOLLOWING FORMULAS AND ADD TO THE
EXTENDED PROFILE

$$F_1 \left(\sqrt{\frac{2h}{R}} \right) \left(\sqrt{\frac{805}{K}} \right) \cdot F_2 \cdot \sqrt{h} \cdot F_1$$

WHERE

- F₁ IS THE RADIUS OF THE FIRST FRESNEL ZONE IN FEET
F₂ IS THE FREQUENCY UNDER CONSIDERATION IN GIGAHERTZ (GP/10)
d IS THE DISTANCE IN MILES FROM ONE END OF THE PATH TO THE POINT
UNDER CONSIDERATION
D IS THE TOTAL PATH LENGTH IN MILES
F_n IS THE RADIUS OF THE NTH FRESNEL ZONE IN FEET
n IS THE ORDER OF THE FRESNEL ZONE AND CAN BE ANY WHOLE
POSITIVE NUMBER

SYMBOLS

- FRESNEL ZONE CLEARANCE
EARTH CURVATURE FROM K (m)
MAN MADE STRUCTURE
OBSTRUCTION OFF PATH WITHIN 1000 FEET
PREDICTED VEGETATION GROWTH
EXISTING HEIGHT OF VEGETATION
GROUND ELEVATION AMSL K (m)
POSSIBLE REFLECTION POINT
HEIGHT OF FINAL RADIATOR CENTERLINE
ABOVE GROUND

STATION (A) HATTITOWN

LAT

LONG

GROUND ELEV FEET ABOVE MEAN SEA LEVEL

REQUIRED HEIGHT OF FINAL RADIATOR CENTER LINE FEET ABOVE GROUND

AZIMUTH (A) TO (B) CW FROM TRUE NORTH

STATION (B) LANGLEY WATER TOWER

LAT

LONG

GROUND ELEV FEET ABOVE MEAN SEA LEVEL

REQUIRED HEIGHT OF FINAL RADIATOR CENTER LINE FEET ABOVE GROUND

AZIMUTH (B) TO (A) CW FROM TRUE NORTH

FRESNEL CALCULATIONS MADE FOR GIGAHERTZ

MAGNETIC DECLINATION OF TRUE NORTH

PATH AZIMUTHS AND DISTANCES ARE SCALED INVERSE POSITION OTHER

CERTIFICATION

SURVEY BY

DRAWN BY

DATE

REVISED BY

DATE

EARTH PROFILE

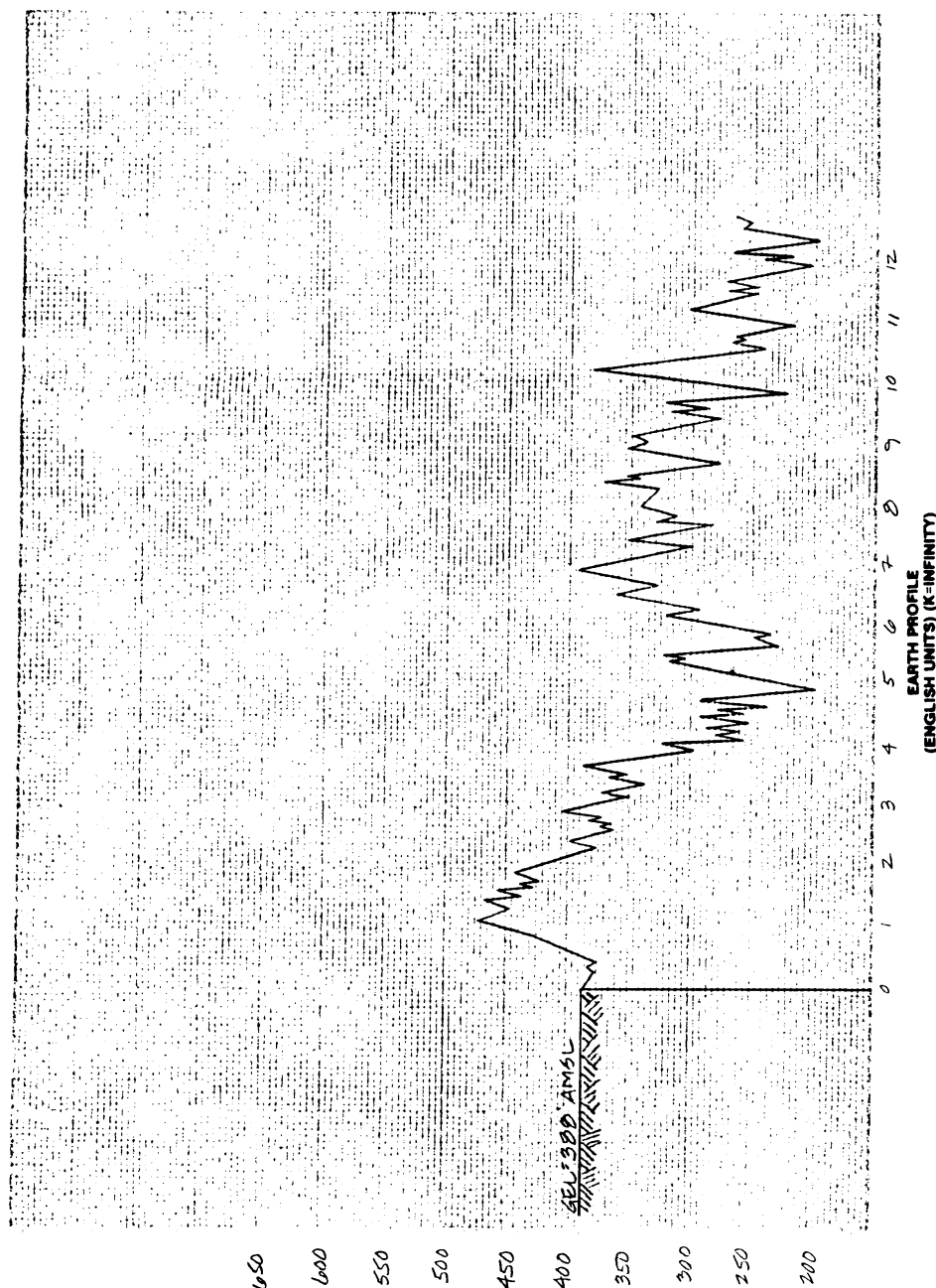
CUSTOMER

SYSTEM

CLIENT

DESIGN DEPARTMENT

OTHER



SYSTEM

VERTICAL SCALE 50 FEET—ELEVATION PER MAJOR DIVISION

HORIZONTAL SCALE 1 MILES—PATH PER MAJOR DIVISION

STATION (A) HATTITOWN STATION (B) LANGLEY WATER TOWER

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USE OF FLAT EARTH PROFILE FOR WITHIN THE HORIZON
AND BEYOND THE HORIZON RADIO PATHS

1. USE THE SYMBOLS SHOWN BELOW
2. USE A CONVERSION SCALE FOR DISTANCE AND ELEVATIONS
3. REPRESENT THE PATH AS A STRAIGHT LINE
4. CALCULATE THE EFFECTIVE EARTH RADIUS TO CORRECT FOR EARTH BULGE AT THE CRITICAL POINTS AND ADD TO THE FLAT EARTH ELEVATION

$$h = \left(\frac{0.87}{K} \right) f_1 f_2$$

WHERE

h = HEIGHT OF CORRECTION IN FEET
 K = RATIO OF EFFECTIVE EARTH RADIUS
TO TRUE EARTH RADIUS

f_1 = DISTANCE FROM STATION "A" TO POINT UNDER CONSIDERATION IN
STATUTE MILES
 f_2 = DISTANCE FROM STATION "B" TO POINT UNDER CONSIDERATION IN
STATUTE MILES

5. ADD ANY MAN MADE STRUCTURES AND PERENNIAL GROWTH
6. CALCULATE THE DESIRED PRESHEL ZONE RADIUS FOR THE POINTS AND FREQUENCIES
UNDER CONSIDERATION USING THE FOLLOWING FORMULAS AND ADD TO THE
EXTENDED PROFILE

$$f_1 = \sqrt{\frac{2}{K}} \sqrt{\frac{d \cdot d}{d + d}} \quad f_2 = \sqrt{d + d} \cdot f_1$$

WHERE

f_1 IS THE RADIUS OF THE FIRST PRESHEL ZONE IN FEET

d IS THE FREQUENCY UNDER CONSIDERATION IN GHARITZ (MHz)

d IS THE DISTANCE IN MILES FROM ONE END OF THE PATH TO THE POINT
UNDER CONSIDERATION

d IS THE TOTAL PATH LENGTH IN MILES

f_2 IS THE RADIUS OF THE 2ND PRESHEL ZONE IN FEET

n IS THE ORDER OF THE PRESHEL ZONE AND CAN BE ANY WHOLE
POSITIVE NUMBER

SYMBOLS

FRESHEL ZONE CLEARANCE
EARTH CURVATURE FROM K (m)
MAN MADE STRUCTURE
OBSTRUCTION OFF PATH WITHIN 1000 FEET
PREDICTED VEGETATION GROWTH
EXISTING HEIGHT OF VEGETATION
GROUND ELEVATION AMSL K (m)
POSSIBLE REFLECTION POINT
HEIGHT OF FINAL RADIATOR CENTERLINE
ABOVE GROUND

STATION (A)

LAT

LONG

GROUND ELEV

REQUIRED HEIGHT OF FINAL RADIATOR CENTER LINE

FEET ABOVE MEAN SEA LEVEL

FEET ABOVE GROUND

AZIMUTH (A) TO (B)

OW FROM TRUE NORTH

STATION (B)

LAT

LONG

GROUND ELEV

REQUIRED HEIGHT OF FINAL RADIATOR CENTER LINE

FEET ABOVE MEAN SEA LEVEL

FEET ABOVE GROUND

AZIMUTH (B) TO (A)

OW FROM TRUE NORTH

FRESHEL CALCULATIONS MADE FOR

GHARITZ

MAGNETIC DECLINATION

OF TRUE NORTH

PATH AZIMUTHS AND DISTANCES ARE

INVERSE POSITION

OTHER

CERTIFICATION

SURVEY BY

DATE

DESIGNED BY

DATE

REVISED BY

DATE

EARTH PROFILE

CUSTOMER

SYSTEM

CLIENT

SURVEYOR

DESIGN DEPARTMENT

OTHER

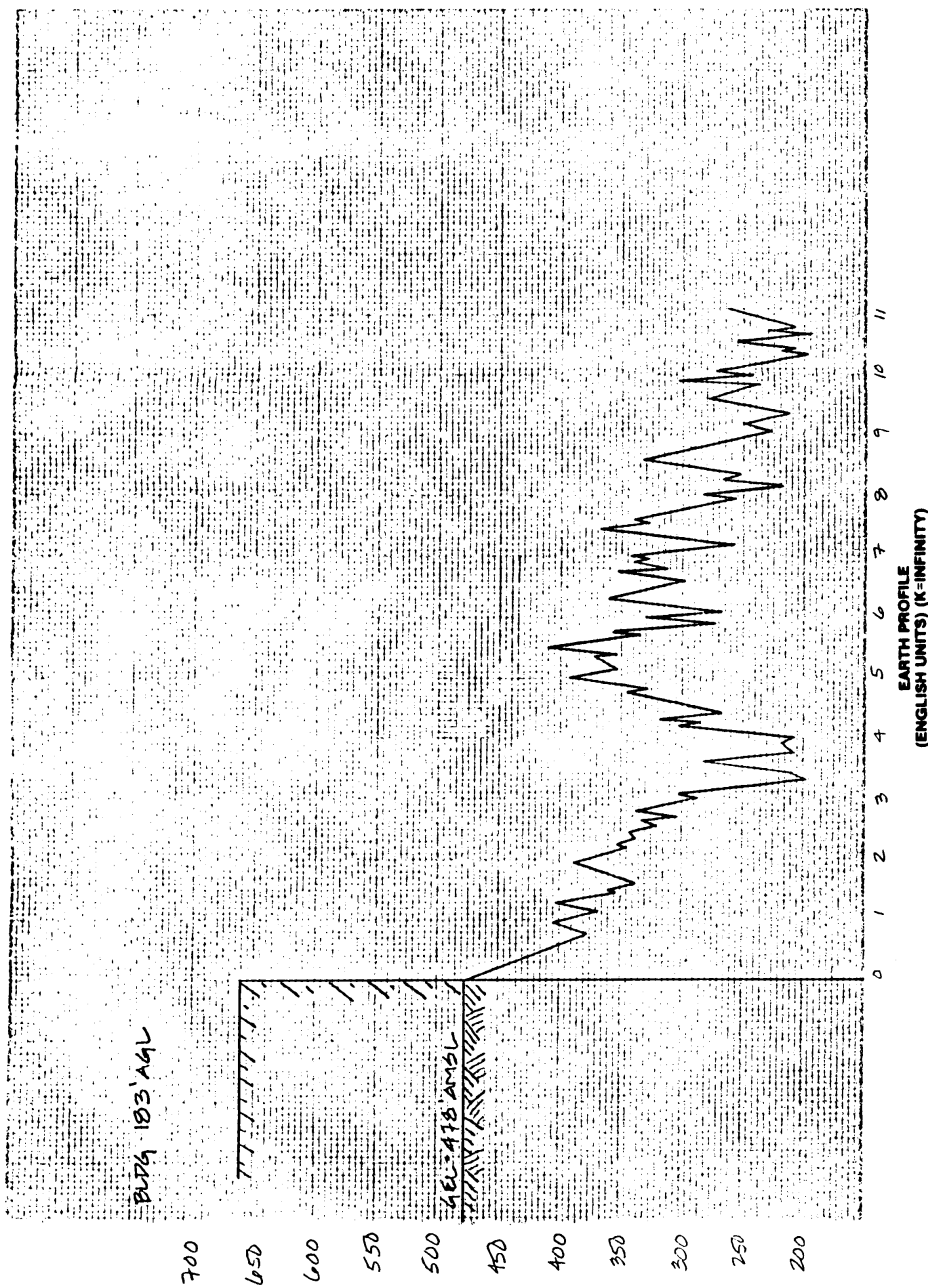
CLEARANCE CRITERIA BY

CLIENT

SURVEYOR

DESIGN DEPARTMENT

OTHER



SYSTEM

VERTICAL SCALE

50

FEET—ELEVATION PER MAJOR DIVISION

HORIZONTAL SCALE

1

MILES—PATH PER MAJOR DIVISION

STATION (A) BESSON INTERNATIONAL CENTER

STATION (B) LANGLEY WATER PINE

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